

## Bio-Inspired Space Environment-Resistant Polymer Composite

Completed Technology Project (2017 - 2018)



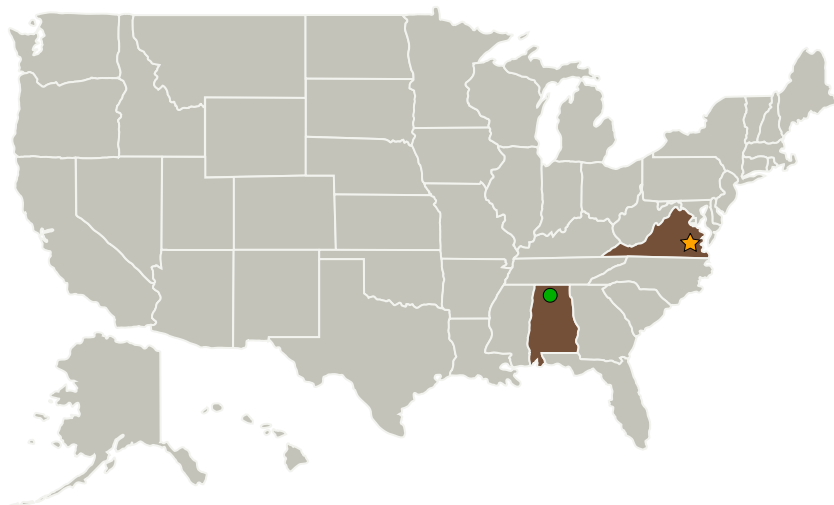
## Project Introduction

Use of inorganic nanoparticles which have been recently explored for therapeutic purposes in the treatment of oxidative stress disorder, cancer and heart diseases due to their strong free radical scavenging capacity (anti-oxidant).#Candidate nanoparticles include  $\text{Al}_2\text{TiO}_5$ ,  $\text{CeO}_2$ , etc.#Selected inorganic nanoparticles have been proven to show excellent free radical scavenging capabilities.#Synthesis of nanocomposite (cyanate ester, bismaleimide, etc.) incorporated with nanoparticles and fibers.#Space environment resistant property is characterized under high energy radiation exposure (high energy proton, electron, UV, vacuum, etc.) via collaboration (MSFC).

## Anticipated Benefits

This work benefits human exploration for the moon and mars. Space environment-resistant load-bearing polymer composite by incorporating bio-inspired inorganic free radical scavenging agents (FRSA) for long-term deep space exploration missions.

## Primary U.S. Work Locations and Key Partners



Bio-Inspired Space  
Environment-Resistant Polymer  
Composite

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## Bio-Inspired Space Environment-Resistant Polymer Composite



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Organizations Performing Work	Role	Type	Location
★ Langley Research Center(LaRC)	Lead Organization	NASA Center	Hampton, Virginia
● Marshall Space Flight Center(MSFC)	Supporting Organization	NASA Center	Huntsville, Alabama
National Institute of Aerospace	Supporting Organization	Academia	Hampton, Virginia

## Primary U.S. Work Locations

Alabama

Virginia

## Project Transitions

**October 2017:** Project Start

 **September 2018:** Closed out

**Closeout Summary:** Developed a novel space environment-resistant load-bearing polymer composite by incorporating bio-inspired inorganic free radical scavenging agents (FRSA) for long-term deep space exploration missions.

## Project Website:

[https://www.nasa.gov/directorates/spacetech/innovation\\_fund/index.html#.VQ](https://www.nasa.gov/directorates/spacetech/innovation_fund/index.html#.VQ)

## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Center / Facility:**

Langley Research Center (LaRC)

**Responsible Program:**

Center Innovation Fund: LaRC CIF

## Project Management

**Program Director:**

Michael R Lapointe

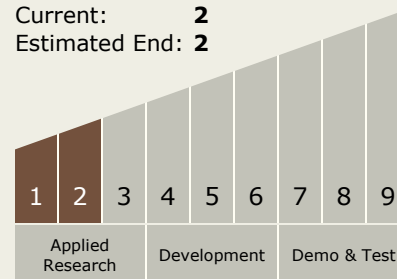
**Program Manager:**

Julie A Williams-byrd

**Principal Investigator:**

Keith Gordon

## Technology Maturity (TRL)

Start: **1**Current: **2**Estimated End: **2**

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## Technology Areas

### Primary:

- TX11 Software, Modeling, Simulation, and Information Processing
  - └ TX11.4 Information Processing
    - └ TX11.4.7 Digital Assistant

## Target Destinations

The Moon, Mars, Others Inside the Solar System